

D 32974

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Name

Reg. No.

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
DECEMBER 2012

Electronics and Communication Engineering

EC 04 306—SOLID STATE DEVICES

(2004 admissions)



Time : Three Hours

Maximum : 100 Marks

Answer all questions.

1. (a) Explain the diffusion process in semiconductors.
(b) Define and explain Quasi Fermi level.
(c) Differentiate Zener diode from PN junction diode.
(d) Explain the advantages of heterojunctions in detail.
(e) Explain the coupled diode model with a neat sketch.
(f) Explain in detail the frequency limitations of transistors.
(g) Differentiate LED from semiconductor LASER.
(h) Draw the structure of PNP diode and explain its construction in detail.

(8 × 5 = 40 marks)
2. (a) (i) Define and explain diffusion length. Obtain an expression for it. (7 marks)
(ii) Differentiate direct from indirect bandgap semiconductors. Give examples for each. (8 marks)

Or

- (b) (i) Explain the temperature dependence of carrier concentration in detail. (7 marks)
(ii) Explain (i) Continuity equation ; (ii) Effective mass. (8 marks)
3. (a) (i) Explain the capacitance of PN junction. Obtain expressions for the same. (7 marks)
(ii) Give an account on metal semiconductor junctions. (8 marks)

Or

- (b) (i) Explain the principle of operation of PN junction and Zener diodes with neat sketches. (7 marks)
(ii) Give an account on "switching diodes". (8 marks)
4. (a) Describe the various types of FETs with neat diagrams. Explain their advantages and potential applications.

Or

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- (b) (i) Differentiate BJT from MOSFET. (5 marks)
(ii) Differentiate FET from MOSFET. (5 marks)
(iii) Differentiate BJT from Zener diode. (5 marks)

5. (a) Write technical notes on :

- (i) GBT.
(ii) UJT.
(iii) SCR.

(3 × 5 = 15 marks)

Or

- (b) Explain the construction and principle of operation of semiconductor laser with neat sketches in detail.

(15 marks)

[4 × 15 = 60 marks]